R-C Thermal Model Parameters

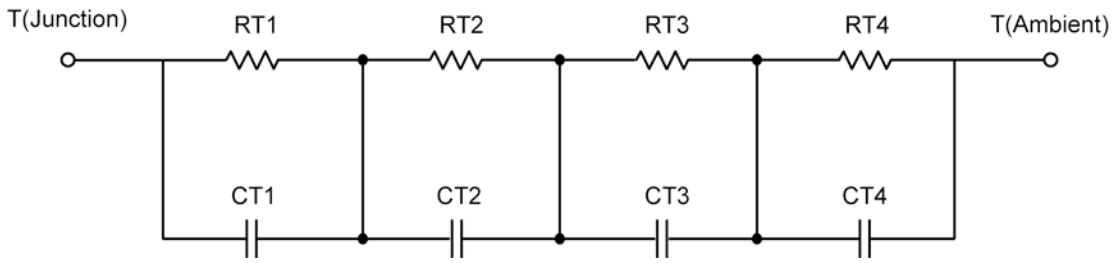
DESCRIPTION

The parametric values in the R-C thermal model have been derived using curve-fitting techniques. These techniques are described in "A Simple Method of Generating Thermal Models for a Power MOSFET"[1]. When implemented in P-Spice, these values have matching characteristic curves to the Single Pulse Transient Thermal Impedance curves for the MOSFET.

R-C values for the electrical circuit in the Foster/Tank and Cauer/Filter configurations are included.

Note:
For a detailed explanation of implementing these values in P-SPICE, refer to Application Note AN609 Thermal Simulations Of Power MOSFETs on P-SPICE Platform.

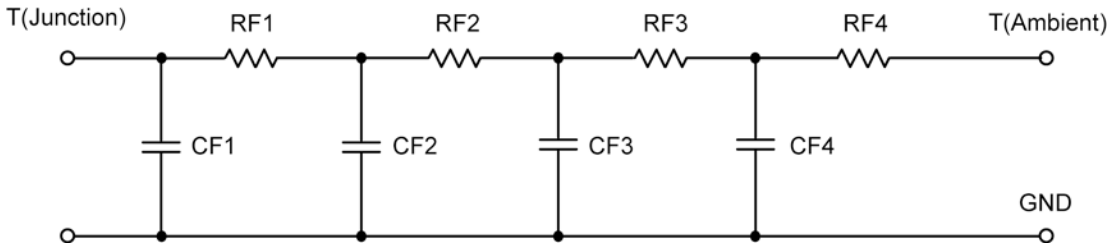
R-C THERMAL MODEL FOR TANK CONFIGURATION



R-C VALUES FOR TANK CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RT1	9.4938	N/A	9.9253
RT2	2.4395	N/A	4.5035
RT3	24.1011	N/A	5.0138
RT4	48.9656	N/A	1.5574
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CT1	25.3537 m	N/A	145.6245 m
CT2	1.1335 m	N/A	61.6563 m
CT3	68.8236 m	N/A	12.6087 m
CT4	1.1715	N/A	2.6992 m

This document is intended as a SPICE modeling guideline and does not constitute a commercial product data sheet. Designers should refer to the appropriate data sheet of the same number for guaranteed specification limits.

R-C THERMAL MODEL FOR FILTER CONFIGURATION

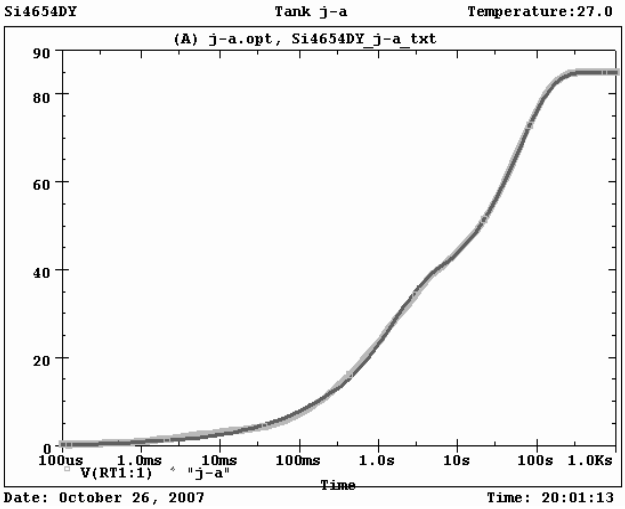


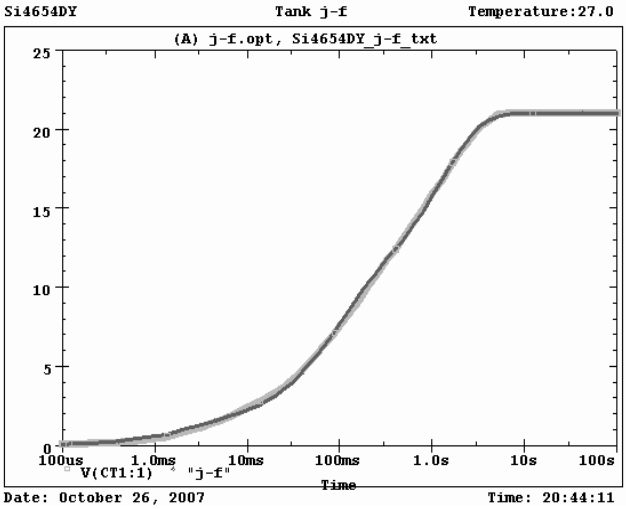
R-C VALUES FOR FILTER CONFIGURATION			
Thermal Resistance (°C/W)			
Junction to	**Ambient**	**Case**	**Foot**
RF1	3.4531	N/A	2.7234
RF2	19.7740	N/A	7.6947
RF3	15.8765	N/A	1.7987
RF4	45.8964	N/A	8.7832
Thermal Capacitance (Joules/°C)			
Junction to	**Ambient**	**Case**	**Foot**
CF1	1.2966 m	N/A	2.2407 m
CF2	21.9384 m	N/A	10.1473 m
CF3	72.0132 m	N/A	45.3693 m
CF4	1.1501	N/A	74.0549 m

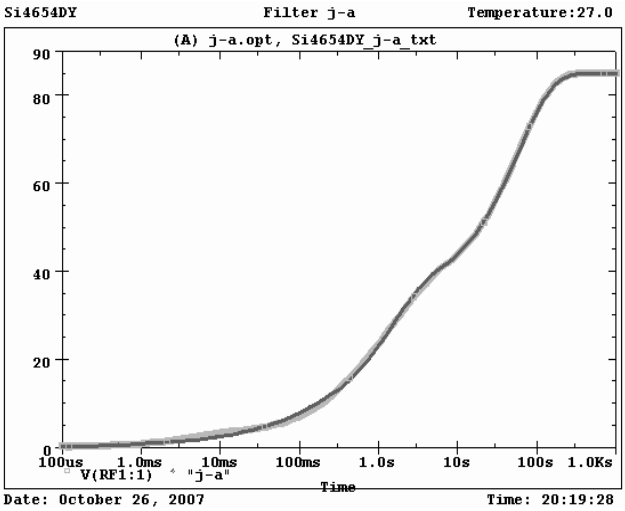
Note: NA indicates not applicable

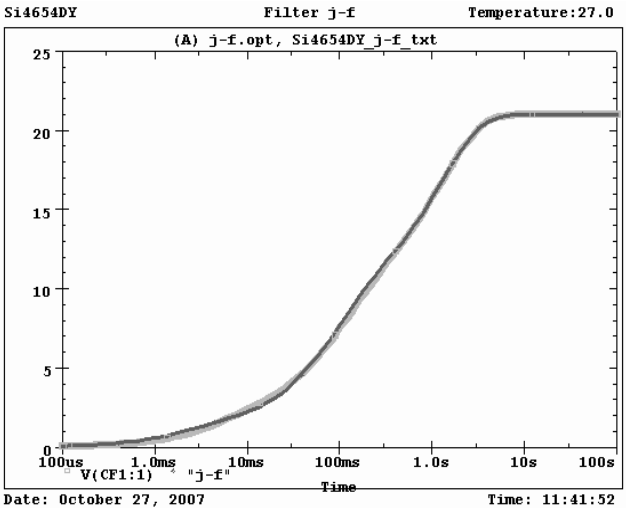
Reference:

[1] "A Simple Method of Generating Thermal Models for a Power MOSFET" by Wharton McDaniel and Kandarp Pandya, IEEE / SEMITHERM 2002


Si4654DY
Tank j-a
Temperature:27.0
(A) j-a.opt, Si4654DY_j-a_txt
90
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RT1:1)
"j-a"
Time
Date: October 26, 2007
Time: 20:01:13


Si4654DY
Tank j-f
Temperature:27.0
(A) j-f.opt, Si4654DY_j-f_txt
25
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CT1:1)
"j-f"
Time
Date: October 26, 2007
Time: 20:44:11


Si4654DY
Filter j-a
Temperature:27.0
(A) j-a.opt, Si4654DY_j-a_txt
90
80
60
40
20
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
1.0Ks
V(RF1:1)
"j-a"
Time
Date: October 26, 2007
Time: 20:19:28


Si4654DY
Filter j-f
Temperature:27.0
(A) j-f.opt, Si4654DY_j-f_txt
25
20
15
10
5
0
100us
1.0ms
10ms
100ms
1.0s
10s
100s
V(CF1:1)
"j-f"
Time
Date: October 27, 2007
Time: 11:41:52